

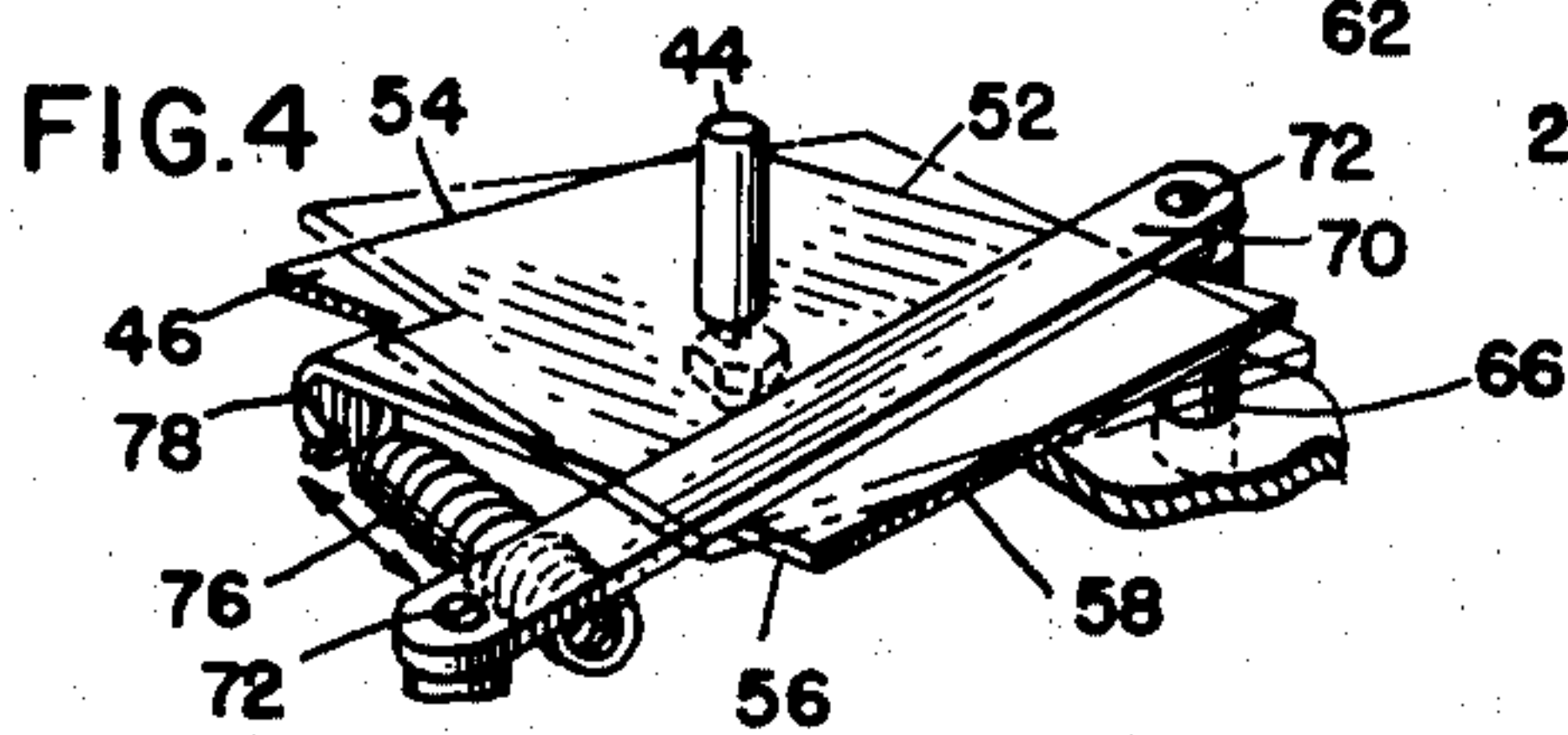
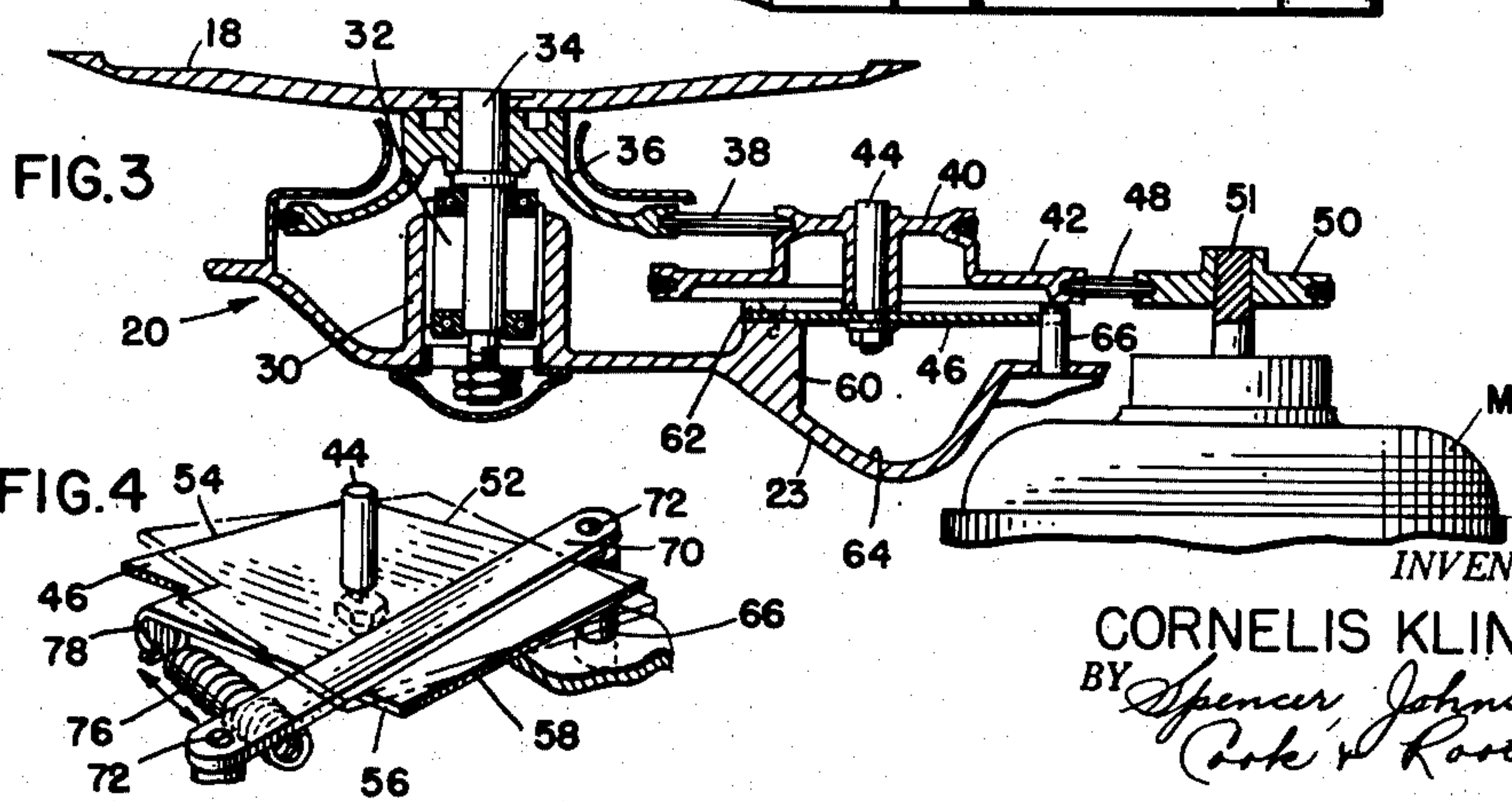
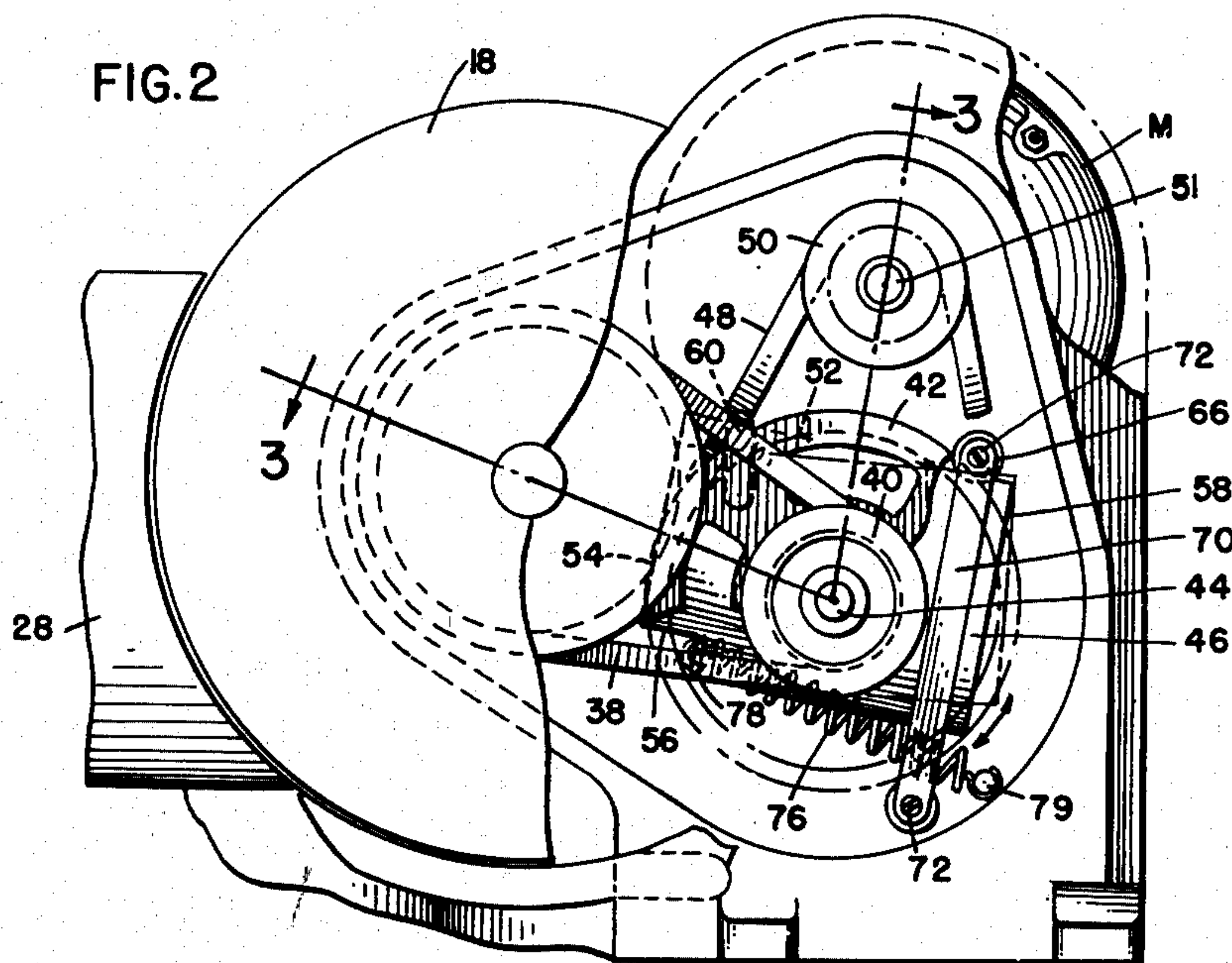
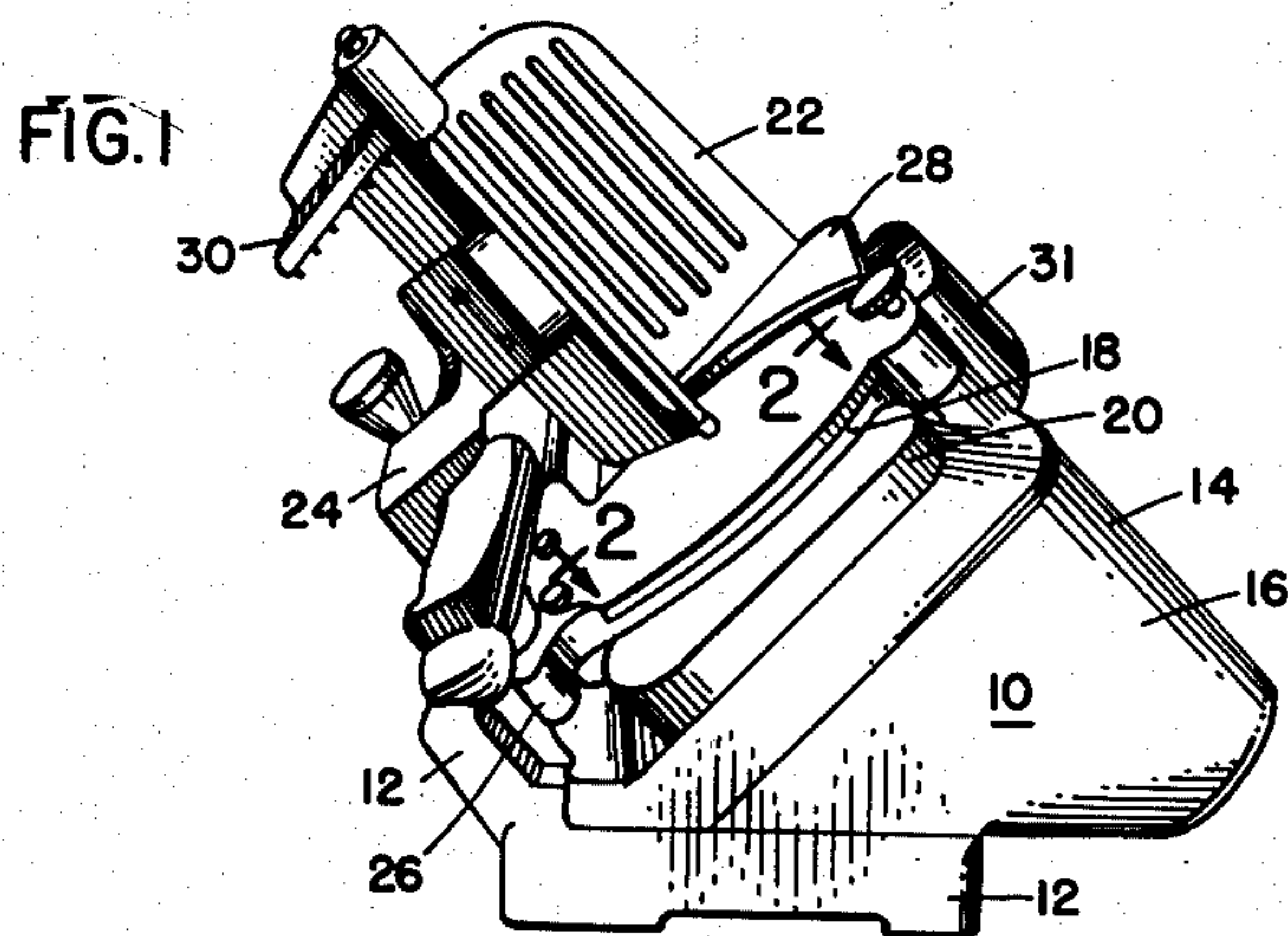
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C. KLINGENS

2,629,263

BELT TENSION EQUALIZING DEVICE

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INVENTOR:  
CORNELIS KLINGENS  
BY *Spencer Johnston,*  
*Cook & Root*

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## UNITED STATES PATENT OFFICE

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## BELT TENSION EQUALIZING DEVICE

Cornelis Klingens, La Porte, Ind., assignor to U. S. Slicing Machine Company, Inc., La Porte, Ind., a corporation of Indiana

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8 Claims. (Cl. 74-242.15)

1

The improved belt tightening and equalizing apparatus comprising the present invention is primarily adapted for use in connection with food slicing machines of the type shown and described in my copending application, Serial No. 186,646, filed of even date herewith. The invention is however capable of other uses and the same may if desired be employed, with or without modification, in connection with other slicing machines of the type employing a knife box having disposed therein the driving connections for connecting the motor shaft to the knife shaft.

It is among the principal objects of the present invention to provide a driving connection of the belt and pulley type between the driving motor shaft and the knife shaft of a slicing machine and including an idler pulley assembly which operates not only to transmit motion from the belt which passes over the motor shaft pulley to the belt which passes over the knife shaft pulley, but which at the same time operates to equalize the tension of both belts as well as to take up any slack which might from time to time otherwise occur in either belt.

A further and important object of the invention is to provide a belt tightening and equalizing mechanism for slicing machines of the type outlined above in which the operative parts thereof are small and compact and may readily occupy a position within the knife box without consuming too much space.

Yet another object of the invention is to provide a novel type of floating bearing assembly for the idler pulley construction associated with the driving mechanism for the slicing knife, which assembly is extremely simple in its construction and may consequently be manufactured at a low cost.

A still further object of the invention is to provide such a floating bearing assembly in which the parts thereof are readily disassembled from the slicing machine knife box for the purpose of inspection, repair or substitution.

Another object of the invention is to provide such a floating bearing which is rugged and durable and which consequently is unlikely to get out of order.

Other objects and advantages of the invention, not at this time enumerated, will become readily apparent as the nature of the invention is better understood.

In the accompanying single sheet of drawings forming a part of this specification:

Fig. 1 is a perspective view of a slicing machine to which the improved belt tightening apparatus has been applied.

2

Fig. 2 is a sectional view taken substantially along the plane indicated by the line 2-2 of Fig. 1 in the direction of the arrows.

Fig. 3 is a sectional view taken substantially along the line 3-3 of Fig. 2.

Fig. 4 is a fragmentary perspective view of a floating mounting piece employed in connection with the present invention and showing the manner in which it is mounted within the knife box casing.

Referring now to the drawings in detail, the food slicing machine to which the present belt tightening apparatus is applied is substantially identical with that shown in the above mentioned copending application. This machine involves in its general organization a supporting structure or main frame 10 (Fig. 1), which may be formed as an aluminum or other metallic casting. The frame 10 includes a base 12 and an upstanding casing 14 having a motor housing section 16 adapted to enclose therein the driving motor M for the usual circular rotary knife 18 which is supported for rotation about an inclined axis within a knife box 20 integrally formed and projecting laterally from the motor housing 16. An inclined food table 22 of the V-shaped gravity feed type is arranged perpendicular to the slicing knife 18 so that a block of foodstuff carried on the food table will be fed by gravity to the cutting plane of the knife for cutting slices from the piece of foodstuff. The inclined food table is removably mounted on a bracket 24 which is connected to a slidable carriage 26 whereby the food table may be reciprocated in a linear path. A gauge plate 28 is provided for the purpose of gauging the thickness of slices to be cut from the foodstuff by the slicing knife 18. A food pusher 30 is adapted to cooperate with the food table for the purpose of assisting the block of foodstuff to move by gravity down the food table toward the slicing knife. A slice receiving table (not shown) is disposed beneath and behind the plane of the cutting knife and gauge plate for the purpose of receiving thereon slices of foodstuff severed from the main body thereof. A knife sharpener mechanism designated in its entirety at 31 is provided for the purpose of sharpening and burring the edge of the circular knife 18 when required.

No claim is made herein to the arrangement of parts briefly outlined above, the same being covered either in my previously mentioned copending application or in my other copending applications, Serial Nos. 186,647, 186,649, and 186,650, filed of even date herewith, the novelty of the present invention residing rather in the novel construction and arrangement of the knife box



3

20 and the belt tightening mechanism which it encloses and which will subsequently be more fully described and claimed.

Referring now to Figs. 2, 3 and 4, the knife box 20 forms a part of the main frame or casting 10 and is provided with a bottom 23 of irregular shape. The bottom 23 is formed with an upstanding boss 30 thereon which constitutes the outer confining tubular portion of an anti-friction bearing assembly 32 by means of which the knife shaft 34, to which the knife 18 is secured, is rotatably mounted. The knife shaft 34 has mounted thereon a knife pulley 36 which is operatively connected by means of a belt 38 to a relatively small idler pulley 40 which may be integrally formed with or otherwise secured to a relatively large pulley 42, the pulley assembly 40, 42 being rotatably journaled on a stub shaft 44 carried by a floating plate 46 which is loosely disposed within the knife box 20 and the nature and function of which will subsequently be described. A belt 48 passes over the pulley 42 and over a motor shaft pulley 50 mounted on the motor shaft 51 of the motor M. Thus, it will be seen that upon energization of the motor M and subsequent rotation of its shaft 52 a drive will exist from the shaft 52 through the pulleys 50, 42, 40 and 36 to the knife shaft 34.

As previously set forth, the supporting plate 46 for the stub shaft 44 is loosely disposed within the knife box 20, and it may be referred to as a floating plate. The plate 46 is in the form of a flat sheet of metal which is generally rectangular in shape and the four sides thereof have been designated at 52, 54, 56 and 58, respectively. The underneath surface of the plate 46 in the vicinity of the corner thereof defined by the sides 52 and 54 is adapted to rest on an upstanding lug or support 60 integrally formed with the knife box casting and having a flat upper surface 62 designed for face-to-face contact with the underneath surface of the plate 46. A well portion 64 exists beneath the pulley assembly 40, 42 and accommodates the reception of the extreme lower end of the stub shaft 44, together with fastening means, by means of which it is attached to the plate 46. A pivot pin 66 projects upwardly from the bottom of the knife box 20 and forms a pivotal axis against which the edge 52 of the plate 46 is adapted to bear so that the plate 46 as an entirety may pivot or slide about the axis of the pin 66. Since both of the pulleys 40 and 42 exist on one side of the plate 46 and are operated upon by means of belts 38 and 48, there is a tendency for the plate to tilt about an axis when the tension of the two belts is applied thereto. In order to prevent such tilting movement and provide a support for the plate 46 a strap 70 extends over the plate 46 in the vicinity of the edge 58 thereof and has its ends secured in a suitable manner, as for example, by screws 72, one of which extends into the bottom wall of the knife box 20 and the other of which may extend into the upper end of the pivot pin 66. A coil spring 76 has one end thereof secured to an ear 78 provided on the edge 56 of the plate 46 and has its other end anchored as at 79 to the bottom wall of the knife box 20.

From the above description of parts it may be seen that the plate 46 and its attached pivot pin 44 are confined within the knife box 20 for limited sliding movement on the lug 60 and strap 70 and that the plate 46 is normally urged by means of the spring 76 in a direction which will tend to apply tension to both of the belts 38 and

4

48. It will also be seen that the pin 66 serves as a pivot point about which the plate 46 may be swung or slid to permit the spring 76 to draw the plate 46 in such a direction as to displace the stub shaft 44 and apply tension to both belts 38 and 48 with substantially equal pressure. The bracket 70 serves to prevent tilting of the shaft 44 by confining the end of the plate adjacent the side 58 and preventing vertical movement thereof away from the bottom of the knife box 20. In the operation of the belt tightening mechanism, when the motor M is energized and the slicing machine is in operation the belt 38 exerts a pull on the upper end of the stub shaft 44 tending to slide the floating plate 46 from beneath the bracket 70. The belt 48 exerts a pull on the lower regions of the stub shaft 44 tending to pull the plate 46 in a direction wherein the edge 52 thereof will engage the pin 66. The spring 76, however, exerts a force on the plate 46 from the edge 56 thereof which is counter to the forces exerted by the two belts 38 and 48 and thus an equalizing force is exerted on the stub shaft 44 which serves to maintain both of the belts taut. The tendency for the floating plate 46 is to bear downwardly against the flat upper surface of the upstanding lug 60 and bear upwardly against the underneath surface of the strap 70. As either belt 38 or 48, or both belts, becomes elongated due to constant usage, any slack that ordinarily would exist by virtue of such elongation is automatically taken up by the stub shaft 44 and its associated idler pulleys 40, 42 and thus throughout the life of the belts 38, 48 little or no attention need be given them.

Changes may be made in the form, construction and arrangement of parts from those disclosed herein without in any way departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claims appended hereto.

The invention is hereby claimed as follows:

1. In a slicing machine of the character described, a knife box casing, a knife pulley rotatably disposed in said casing, a motor shaft pulley, an idler pulley assembly disposed within said casing and including a pair of idler pulleys operatively connected together for rotation in unison, a belt connecting said motor shaft pulley and one of said idler pulleys, a belt connecting said knife pulley and the other idler pulley, a movable support on which said idler pulley assembly is rotatably mounted, means within said knife box upon which said support is borne in sliding and pivotal relationship, and means yieldingly urging said support in a direction having vectorial components capable of applying tension to both of said belts by movements of the idler pulleys away from the pulleys with which they are respectively connected.

2. In a slicing machine of the character described, a knife box casing, a knife pulley rotatably disposed in said casing, a motor shaft pulley, an idler pulley assembly disposed within said casing and including a pair of idler pulleys operatively connected together for rotation in unison, a belt connecting said motor shaft pulley and one of said idler pulleys, a belt connecting said knife pulley and the other idler pulley, a movable support on which said idler pulley assembly is rotatably mounted, an abutment in said knife box against which a portion of said support on one side of said idler pulley assembly is adapted to bear in sliding and pivotal relation-



5

ship with respect thereto, and means connected to said support at a point on the other side of said idler pulley assembly for yieldingly urging the support in a direction tending to apply tension to both belts and cause the support to bear against said abutment.

3. In a slicing machine of the character described, a knife box casing, a knife pulley rotatably disposed in said casing, a motor shaft pulley, an idler pulley assembly disposed within said casing and including a pair of idler pulleys operatively connected together for rotation in unison about a common axis, a belt connecting said motor shaft pulley and one of said idler pulleys, a belt connecting said knife pulley and the other idler pulley, a movable support on which said idler pulley assembly is rotatably mounted, an abutment in said knife box against which a portion of said support on one side of said axis is adapted to bear in sliding and pivotal relationship with respect thereto, and means connected to said support at a point on the other side of said axis for yieldingly urging the support in a direction tending to apply tension to both belts and cause the support to bear against said abutment.

4. In a slicing machine of the character described, a knife box casing having a bottom wall, a knife pulley rotatably disposed in said casing, a motor shaft pulley, an idler pulley assembly disposed within said casing and including a pair of idler pulleys operatively connected together for rotation in unison about a common axis, a belt connecting said motor shaft pulley and one of said idler pulleys, a belt connecting said knife pulley and the other idler pulley, a movable supporting plate on which said idler pulley assembly is mounted, said idler pulleys being disposed on the upper side of said supporting plate, means on said bottom wall providing a sliding support for said supporting plate and designed for sliding engagement with a portion of the lower side of said supporting plate on one side of said axis, means providing a sliding support for the upper side of said supporting plate on the other side of said axis, and means yieldingly urging said support in a direction having vectorial components of motion capable of applying tension to both of said belts by movements of the idler pulleys away from the pulleys with which they are respectively connected.

5. In a slicing machine of the character described, a knife box casing having a bottom wall, a knife pulley rotatably disposed in said casing, a motor shaft pulley, an idler pulley assembly disposed within said casing and including a pair of idler pulleys operatively connected together for rotation in unison, a belt connecting said motor shaft pulley and one of said idler pulleys, a belt connecting said knife pulley and the other idler pulley, a substantially flat supporting plate on which said idler pulley assembly is mounted, said pulleys being disposed on the upper side of said supporting plate, means providing a bearing surface below said plate on the bottom wall of said casing and upon which said plate is adapted to abut in sliding relation, means providing a second bearing surface above said plate and upon which the plate is adapted to slide, and means yieldingly urging said support in a direction having vectorial components of motion capable of applying tension to both of said belts by movements of the idler pulleys away from the pulleys with which they are respectively connected.

6. In a slicing machine of the character de-

6

scribed, a knife box casing having a bottom wall, a knife pulley rotatably disposed in said casing, a motor shaft pulley, an idler pulley assembly disposed within said casing and including a pair of idler pulleys operatively connected together for rotation in unison, a belt connecting said motor shaft pulley and one of said idler pulleys, a belt connecting said knife pulley and the other idler pulley, a pivot pin projecting upwardly from said bottom wall and designed for sliding engagement with an edge of a supporting plate on one side of said idler pulley assembly, and a spring connected to said plate at a point thereon on the opposite side of said idler pulley assembly for urging said supporting plate into engagement with said pivot pin and consequently for applying tension to both of said belts through the media of said idler pulleys.

7. In a slicing machine of the character described, a knife box casing having a bottom wall, a knife pulley rotatably disposed within said casing, a motor shaft pulley, a pair of idler pulleys within said casing operatively connected together for rotation about a common axis, a floating supporting plate for said idler pulleys having a bottom surface thereof slidably supported on said bottom wall, said idler pulleys being disposed on one side of said plate, a belt connecting said motor shaft pulley with one of said idler pulleys, a belt connecting said knife pulley with the other idler pulley, an abutment projecting upwardly from said bottom wall and disposed exteriorly of the angle subtended by lines passing through said idler pulley axis and the axes of said other pulleys, said abutment being designed for sliding engagement with an edge of said plate, and spring means bearing against said plate and normally urging the same in a direction having vectorial components capable of applying tension of both of said belts.

8. In a slicing machine of the character described, a knife box casing having a bottom wall, a knife pulley rotatably disposed within said casing, a motor shaft pulley, a pair of idler pulleys within said casing operatively connected together for rotation about a common axis, a floating supporting plate for said idler pulleys having a bottom surface thereof slidably supported on said bottom wall, said idler pulleys being disposed on one side of said plate, a belt connecting said motor shaft pulley with one of said idler pulleys, a belt connecting said knife pulley with the other idler pulley, an abutment projecting upwardly from said bottom wall and disposed exteriorly of the angle subtended by lines passing through said idler pulley axis and the axes of said pulleys, said abutment being designed for sliding engagement with an edge of said plate, spring means bearing against said plate and normally urging the same in a direction having vectorial components capable of applying tension to both of said belts, and means on said casing overlying said plate and providing a bearing support for a portion of the upper surface thereof.

CORNELIS KLINGENS.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
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